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SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE
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PROGRAMME OF WORK

Progress report on issues in the programme of work of the Subsidiary Body for Scientific and Technological Advice

Note by the secretariat

Addendum

RESEARCH AND SYSTEMATIC OBSERVATION

I. INTRODUCTION

A. Mandate

1. At its second session the Subsidiary Body for Scientific and Technological Advice (SBSTA) took note of the information provided by the World Meteorological Organization (WMO) and a number of Parties, relevant to the implementation of Article 5 of the Convention. It requested the secretariat to prepare a summary report on research and observation issues, with attention to Article 5, and particularly to Article 5(c), of the Convention, in close collaboration with Parties and concerned organizations, and taking into account the recommendations of the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), for consideration by the third session of the SBSTA and subsequently by the Conference of the Parties (COP) (FCCC/SBSTA/1996/8, para. 32).

2. Article 5 of the Convention states that, "In carrying out their commitments under Article 4, paragraph 1 (g), the Parties shall:

(a) Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort;

(b) Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond national jurisdiction; and

(c) Take into account the particular concerns and needs of developing countries and cooperate in improving their endogenous capacities and capabilities to participate in the efforts referred to in subparagraphs (a) and (b) above."

3. Article 4, paragraph 1 (g) of the Convention states that Parties shall "Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies".

B. Scope of the note

4. The range of research observation and data processing areas indicated in Article 4.1(g) is extremely broad. This note, however, is limited in three respects. Firstly, it deals mainly with atmospheric and oceanographic research (see paragraph 11 below). Secondly, for these it provides only a summary overview and, lastly, it relates only to the international level, and not to national activities or needs.

II. SUMMARY REPORT ON RESEARCH AND SYSTEMATIC OBSERVATION

A. Background

5. Article 2 defines the Convention's ultimate objective as "... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame

sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner".

6. The required level of stabilization cannot be determined without further research and systematic observation to improve understanding of the effects of anthropogenic emissions of greenhouse gases on the climate, and of the impacts of such effects on, for example, ecosystems, sealevel, agricultural production and economic development.

7. In addition, national decision-making in climate-sensitive social and economic sectors such as energy, agriculture, fisheries, construction, transportation, water resources and the retail and leisure industries benefits directly from improved understanding of climate and its natural variability and the development of climate-related applications.

8. In Article 5, as well as in other Articles, the Convention clearly recognizes the significance of research, systematic observation and data archives and the need for international cooperation in these issues. These activities are currently being carried out through a number of international organizations and programmes. Recognizing the importance of the Convention, these organizations and programmes have expressed their interest in supporting the activities of the Convention.

9. The issues of climate and climate change are extremely complex and very broad in scope. Consequently, a comprehensive approach to the programmes of research and systematic observation must be adopted. Clearly, too, priorities must be established to ensure an effective response to the needs of the Parties. Article 5(c) emphasizes that activities in support of developing country capability deserve priority consideration.

B. Research

10. As indicated above, research activities cover a broad range of fields which can conveniently be broken down into a number of categories, appropriate to the Convention needs. Activities in some of these categories are described below.

1. Atmosphere and oceans

11. The purpose of this research is, *inter alia*, to improve scientific understanding of the carbon cycle, atmospheric chemistry and the role of greenhouse gases and aerosols in the atmosphere warming process. It also includes research into the effects of atmospheric warming on the climate system, sealevel rise and the frequency and severity of extreme weather events. At present most research in these areas is carried out in the more developed countries either in government research establishments or at universities and other academic research institutes. At the international level, research is coordinated through the World Climate Programme, in particular the World Climate Research Programme (WCRP), the

International Geosphere-Biosphere Programme (IGBP) and the Intergovernmental Oceanographic Commission (IOC). Regular assessments of existing knowledge are carried out by the Intergovernmental Panel on Climate Change (IPCC).

2. Impact and adaptation

12. This covers a vast spectrum of activities concerning the impacts of global warming on terrestrial and oceanic ecosystems, as well as the socio-economic impacts of sealevel rise and changes in the climate system, in particular severe weather events.

3. Mitigation

13. This research covers technical and policy measures to limit or reduce emissions of greenhouse gases and barriers to such measures. Again most research is carried out at national level by government and academic institutions but considerable work is also being carried out by the private sector. At the international level many organizations are involved. IPCC regularly assesses knowledge in these areas.

14. In its Second Assessment Report the IPCC indicated a number of priority areas where additional research work is necessary.

C. Systematic observation of the oceans and atmosphere

15. Global systems for observation began with the WMO World Weather Watch (WWW) in 1962. The WWW comprises a Global Observing System (GOS), a Global Data Processing System (GDPS) and a Global Telecommunications System (GTS). Subsequently, in 1969, WMO established the Global Ozone Observing System (GOOS), and the Background Air Pollution Monitoring Network (BAPMoN) which were expanded in 1987 to the Global Atmosphere Watch (GAW).

16. At the time of the United Nations Conference on the Human Environment in 1972, plans were laid in the scientific and international communities for a more comprehensive Global Environmental Monitoring System (GEMS). This became one of the responsibilities assigned to UNEP in its catalytic and coordinating role in the United Nations system.

17. With the rapid evolution of technologies for observation and the political acceptance of the importance of global environmental problems, particularly global warming and climate change, initiatives have been taken within the last decade to plan and launch a set of global observing systems.

18. One specific programme has been established specifically to meet the need for systematic observation of the climate. The Global Climate Observing System (GCOS), an

initiative of WMO, UNEP, IOC, and the International Council of Scientific Unions (ICSU), addresses the comprehensive observational requirements for climate monitoring, climate change detection and climate forecasting, responses to and impacts of climate change as well as data for national economic decision-making.

19. The GCOS programme is being developed in concert with the GOOS and, for the land surface, the Global Terrestrial Observing System (GTOS). With regard to climate observations, the GCOS will develop capabilities for observations and information management in concert with these systems and those noted in paragraphs 15 and 16.

20. While it is difficult at this stage to identify specific observational requirements, the GCOS, in concert with WWW, GAW, GEMS, GOOS, and GTOS has identified the essential variables needed to monitor climate, quantify climate change, and provide input for climate predication. Variables needed to assess impacts, particularly on critically affected sectors of society, have not been adequately identified to date.

21. For the purposes of the Convention, priority attention should be given to the systematic observation of atmospheric and oceanographic variables which will assist in the detection of climate change, the initialization and validation of climate models and the assessment of impacts. In this regard, the compilation and synthesis of data, particularly satellite data, that may be used by all Parties, for example, in preparing national communications, would be useful.

D. Data management

22. The global observing systems at present being launched are not completely parallel to each other. Some global systems for the atmosphere (WWW and later GAW) have existed since the early 1960s, while global systems for the oceans (GOOS) and the land (GTOS), which cover the other major environmental sectors of the biosphere, are only now being developed. The World Hydrological Cycle Observing System (WHYCOS) is presently being developed in a few regions. The global system for climate (GCOS), the plan for which is ready and approved by the organizations concerned, is an issue-oriented system that draws from all the basic systems for atmosphere, ocean and land.

23. Although in the original planning of the systems it seems to have been taken for granted that separate data management systems should be developed for each one, it has become more and more obvious with the development of modern telecommunications that a common data management system or at least a common strategy would be important for them in their operational stage. It seems to be too early to propose how such a common system should be designed, although there are broader ongoing efforts to streamline data and meta-data reporting among the major institutions involved (Department of Policy Coordination and Sustainable Development, World Bank, UNEP, UNDP, WRI, etc.). Already both the GCOS and GTOS plans provide clear pictures of the needs for data management of those two systems.

24. For regional activities within a data management system, such as harmonization of data, it would be preferable to use centres which have been established for other similar purposes and therefore are already furnished with modern telecommunications and computer equipment. There are a number of such systems, for instance Global Resource Database (GRID) within UNEP, International Oceanographic Data Exchange (IODE) in IOC, and WWW in WMO. Further investigations need to undertaken to find out to what extent existing systems can be used for common data management.

III. COORDINATION AT THE INTERNATIONAL LEVEL

25. Over the past two decades, climate issues have become increasingly important on the international agenda, with regard to both natural climate variability and the potential effects of human activities on future climate.

26. Governments have commitments to ensure the successful implementation of international agreements on climate-related issues. These commitments were triggered, *inter alia*, by concerns about human-induced climate change, its potential adverse impacts and its relationship to the goal of sustainable development.

27. A wide variety of intergovernmental and non-governmental organizations, including the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and its Intergovernmental Oceanographic Commission (IOC), the World Health Organization (WHO), the United Nations Development Programme (UNDP), the International Council of Scientific Unions (ICSU) and the International Social Science Council (ISSC), are involved in climate-related research and systematic observation. The WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) complements this research role with timely assessments of the state of knowledge on many aspects of climate change and identification of priority needs for further activities on scientific, technical and cross-cutting issues.

28. WMO and relevant collaborating agencies provide an appropriate framework for addressing the wide range of research issues associated with the oceans and the atmosphere. The World Climate Research Programme, for example, engages scientists and their organizations worldwide on five main research programmes which serve to illustrate the scope of the WCRP interests and its relevance to the Convention. These are the Global Energy and Water Cycle Experiment (GEWEX), the World Ocean Circulation Experiment (WOCE), Climate Variability and Predictability (CLIVAR), Stratospheric Processes and their Role in Climate (SPARC) and the Arctic Climate System Study (ACSYS).

29. WMO, together with its GCOS and GOOS partners, is particularly well placed to take responsibility for coordinating and specification, implementation and operation of systematic, long-term climate monitoring systems and data collection. Under the auspices of the WWW

and the network of national weather services of member countries, together with the IOC IGOSS (Integrated Global Ocean Services System), the basis for an integrated global observing system already exists, and the GCOS concept is being developed to build on these existing systems.

30. Recognizing that the implementation of international agreements places increased demands on international climate-related programmes, Governments at the Intergovernmental Meeting on the World Climate Programme (IGM-WCP), convened by WMO on behalf of participating organizations* and held in Geneva in April 1993, reviewed the ability of these programmes to respond to these challenges. The IGM-WCP called for the preparation of a document which would address worldwide climate-related issues and provide a framework within which Governments, international organizations and non-governmental organizations could plan their own contributions to national and international climate-related programmes, allocate financial and human resources appropriately and benefit from the complementary and coordinated activities being undertaken in other countries. This document, now called "The Climate Agenda - a proposal for an integrating framework for international climate-related programmes", has been drawn up by those international organizations* involved in climate-related activities, working under the auspices of the Coordinating Committee for the World Climate Programme (CCWCP).

31. The Climate Agenda provides an infrastructure to coordinate and strengthen the necessary long-term monitoring and climate research programmes pertaining to the ocean and the atmosphere essential to the implementation of Article 5 and to coordinate the necessary capacity and capability building in developing countries. The Climate Agenda will be an integrated plan for all the climate-related programmes of the sponsoring international agencies, recognizing that these programmes are at different stages of development and that each has its own distinct origin and history.

IV. POSSIBLE ACTION BY THE SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE

32. The SBSTA may wish to take note of this report and:

(a) Invite the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC), and other participants developing the Climate Agenda to inform the SBSTA on recent activities to coordinate long-term monitoring and research programmes related to the oceans and the atmosphere in support of Article 5 of the Convention, particularly the establishment of capacity and capability building mechanisms to assist the full participation of developing countries;

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* FAO, ICSU, ISSC, UNDP, UNEP, UNESCO and its IOC, WHO, and WMO.

(b) Indicate what further work would have to be undertaken by the secretariat. In this context, it may consider requesting the secretariat, in cooperation with relevant international governmental and non-governmental organizations, to convene meetings or workshops of experts of Parties with a view to determining priority needs of Parties in the areas of research and systematic observation of the oceans and atmosphere, as well as other areas, with particular attention to Article 5(c) of the Convention;

(c) Invite the Subsidiary Body for Implementation to take account of Article 5, in particular Article 5(c), when considering the issue of guidance to the financial mechanism of the Convention.

Annex

LIST OF ACRONYMS

ACSYS	- Arctic Climate System Study
BAPMON	- Background Air Pollution Monitoring Network
CCWCP	- Coordinating Committee for the World Climate Programme
CLIVAR	- Climate Variability and Predictability Study
COP	- Conference of the Parties to the United Nations Framework Convention on Climate Change
FAO	- Food and Agriculture Organization of the United Nations
GAW	- Global Atmosphere Watch
GCOS	- Global Climate Observing System
GDPS	- Global Data Processing System of the WWW
GEMS	- Global Environmental Monitoring System
GEWEX	- Global Energy and Water Cycle Experiment
GOOS	- Global Ocean Observing System
GOS	- Global Observing System of the WWW
GRID	- Global Resource Database
GTOS	- Global Terrestrial Observing System
GTS	- Global Telecommunication System of the WWW
ICSU	- International Council of Scientific Unions
IGBP	- International Geosphere-Atmosphere Programme
IGM-WCP	- Intergovernmental Meeting on the World Climate Programme
IGOSS	- Integrated Global Ocean Services System

IOC - International Oceanographic Commission of UNESCO

IODE - International Oceanographic Data Exchange

IPCC - Intergovernmental Panel on Climate Change

ISSC - International Social Science Council

SBSTA - Subsidiary Body on Scientific and Technological Advice

SPARC - Stratospheric Processes and their role in Climate

UNDP - United Nations Development Programme

UNEP - United Nations Environment Programme

UNESCO - United Nations Educational, Scientific and Cultural Organization

UNFCCC - United Nations Framework Convention on Climate Change

WCP - World Climate Programme

WHO - World Health Organization

WCIRP - World Climate Impacts and Response Programme

WCRP - World Climate Research Programme

WMO - World Meteorological Organization

WOCE - World Ocean Circulation Experiment

WRI - World Resources Institute

WWW - World Weather Watch

WHYCOS - World Hydrological Cycle Observing System

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